

Lightweight Thermally Stable Multi-Meter Aperture Submillimeter Reflectors, Phase I

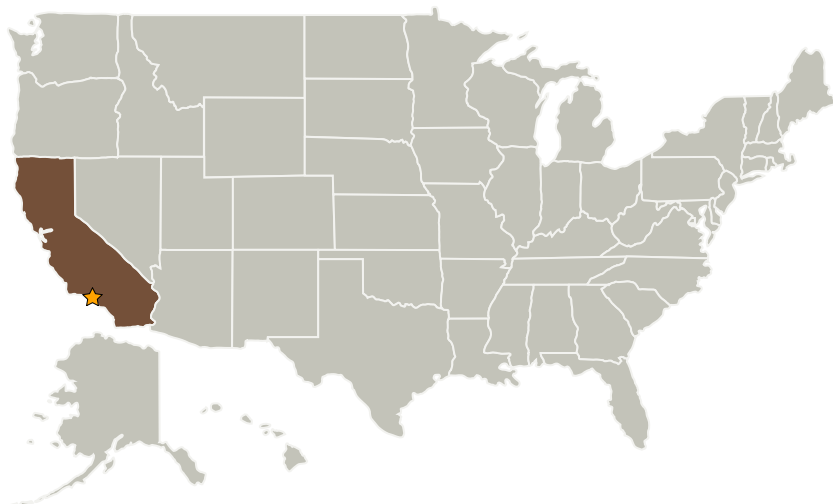
Completed Technology Project (2007 - 2007)



Project Introduction

Future astrophysics missions will require lightweight, thermally stable, submillimeter reflectors in sizes of 4m and greater. To date, graphite fiber reinforced composite (GFRC) construction has been used in many cases to ideally meet the reflector needs of submillimeter and microwave instruments, but only in sizes up to 2m. This project significantly advances the size and accuracy capability of GFRC reflector technology for future missions by focusing on innovation in two limiting areas: precision mandrel fabrication, and core induced surface error. Mandrel cost and quality can often be the most significant budget and schedule challenge to a reflector program. To reduce cost, recent commercial innovations in optical grinding and polishing will be investigated for applicability to fabrication of a 4m convex tool. A variety of traditional and non-conventional tool materials will be considered. No-mandrel assembly concepts will also be investigated. To improve reflector surface accuracy, improvement is needed to mitigate the anisotropic nature of GFRC core. Novel methods of attaching core elements to faceskins will be investigated, as well as alternative core materials and manufacturing approaches. Phase 1 will result in a preliminary point design for a 4m-class submm reflector. Concepts for improvement in mandrel cost and quality, and reduction of core induced surface error, will be defined. After verification of these concepts in early Phase 2, a 4m-class prototype reflector will be built and tested that demonstrates all key aspects of a multi-meter full-scale reflector design and build.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Vanguard Space Technologies, Inc	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.4 Advanced Propulsion
 - └ TX01.4.4 Other Advanced Propulsion Approaches